

Region 9 San Juan River

Data Summary August 2015

Observations

- Results highly variable but clear peaks and subsequent downward trends observed.
- Concentrations of all metals in surface water are consistent with or well below pre-impact concentrations in comparison to historical data
- Total lead and dissolved Al may exceed NN livestock and agricultural supply screening levels on given days in the desert stretches of the San Juan.
- Data variability (August 2015) does not allow for conclusions or predictions about impacts downstream of Four Corners/Beclahbito.

Spill signature difficult to detect

- Distance from the source to San Juan River
 - 120 river miles from spill source to confluence w San Juan River
 - 185 to Four Corners
 - 260 to Mexican Hat
- Several abandoned mines along the San Juan west of Beclahbito
- Exceedences pre and post spill seem to be the result of confounding factors such as storms and flows from desert washes
 - Mexican Hat chronically high
 - McElmo Creek appears to be an ongoing source of dissolved Al

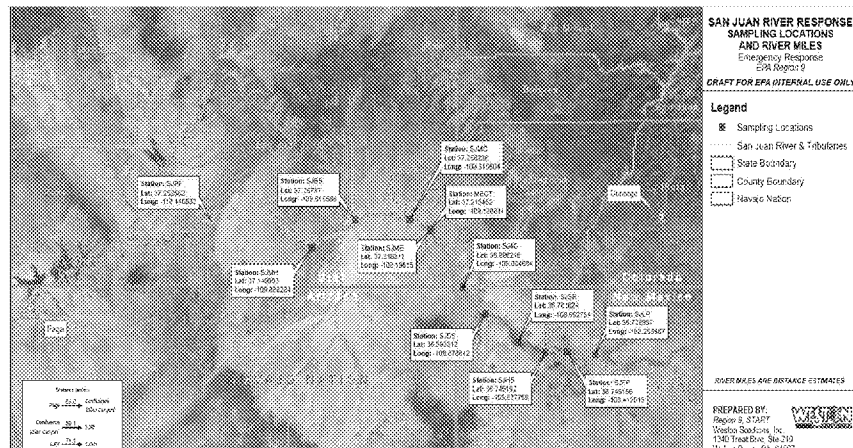
Historical Surface Water Data Set

- Dissolved and Total metal concentrations from the San Juan River water samples were used to estimate pre-event conditions
- Data collected by NNEPA between Sep 2011 – Sep 2013. Provided as part of the Navajo Generating Station permit application.
- Samples collected at San Juan River stations 6, 7 & 8 exhibited highest concentrations (approximately located at 4C, MC and BB respectively)
- EPA ORD calculated Background Threshold Values (BTVs) to predict upper limit of metal concentrations typical of the river.


Background Estimates

Metal concentrations from Historical Data Set	Threshold Values	
Total lead Range: non-detect (ND) – 330 ug/l	BTV, 95% UPL: 284-307 ug/L NN Ag Screening Level: 100 ug/l	
Total Arsenic Range: ND – 62 ug/l	BTV, 95% UPL: 18-57 ug/l	
Total Copper Range: ND – 1,200 ug/l	BTV, 95% UPL: 383-595 ug/l	
Zinc Range: ND – 2,900 ug/l	BTV, 95% UPL: 793 – 950 ug/l	
Total aluminum Range: 14 – 150,000 ug/l	BTV, 95% UPL: 141,424-158,008 ug/l	
Dissolved aluminum Range: ND – 4,300 ug/l	BTV, 95% UPL: 3,250 ug/l (non-parametric) NN Ag Screening level: 5,000 ug/l	

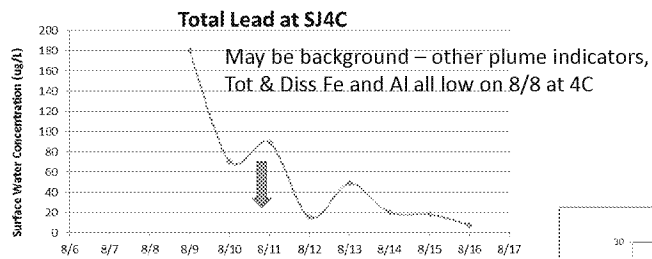
San Juan River Sampling Stations August 2015



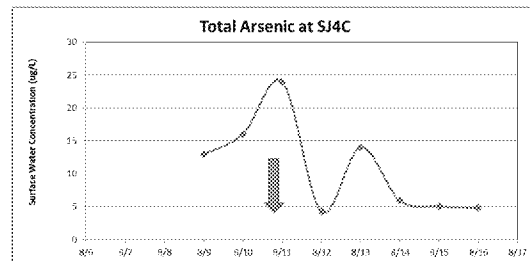
Measurements in August 2015

- Dissolved Aluminum and diss Iron are best predictors of the plume location
 - Throughout the sampling period, diss Al & Fe exhibit high correlation $R^2 = 0.99$
 - Peaks observed on 8/11 at 4C – Four Corners by EPA and UT DEQ 
- Max Lead (total) result in this event was 180 ug/l (historical BTV (low): 284)
 - Lead results peak prior to expected plume front on 8/11 at 4C
 - Reasons unknown but effect also occurred in UT data collected near 4C
- Max Arsenic (total) result was 34 ug/l (historical BTV: 18-57)
 - Most elevated result was at Mexican Hat
 - Detection consistent with plume peak was 25 at 4C on 8/11

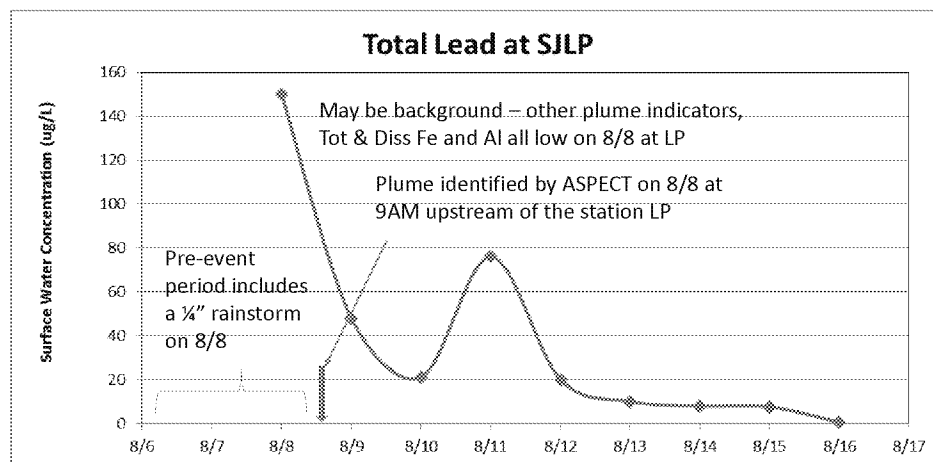
Total Lead & As at Four Corners Sampling Station



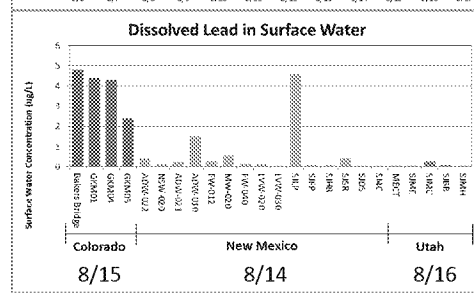
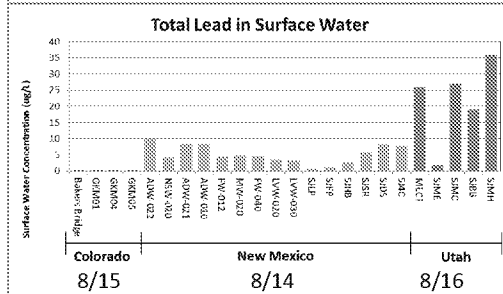
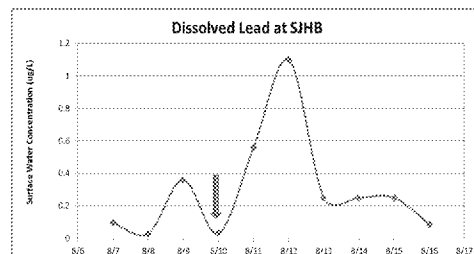
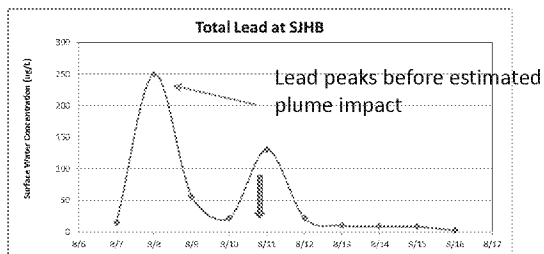
Total Pb peaks between 8/9 & 8/11
Total As peaks at this location between 8/10 & 8/13
Levels remain comparable to 8/15 & 16 on 8/17 & 18
for arsenic (2.1 – 5 ug/l) and lead (5.9 – 7.2 ug/l)



Total Lead at LP – near confluence w Animas



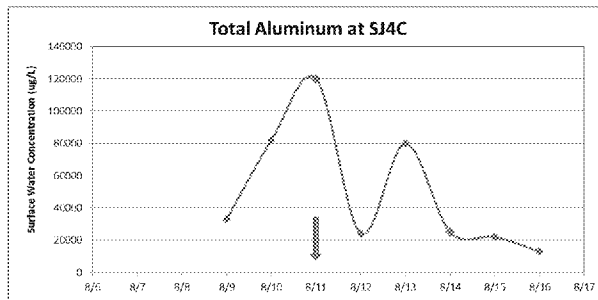
Lead at upstream stations



Total & Dissolved Al

- Max Aluminum (total) result for this event 210,000 ug/l at MH on 8/11
 - Seems to have occurred *before* the plume reached MH (approx 70 river miles ahead of predicted plume front);
 - DS also above 150,000 *after* the plume passed that station (consistent w historical)
- Dissolved Aluminum is best predictor of the plume and may exceed NNSLs in desert stretch of San Juan
 - Peak observed on 8/11 at 4C – Four Corners
 - Widely variable at McElmo Creek
- Max Al (diss) result for this event 82,000 ug/l on 8/13 at DS
 - Presumably after the plume, returning to ND (16th and 17th) one exceedance on 8/17, 17,000 at MH (historical BTV: 3,250)

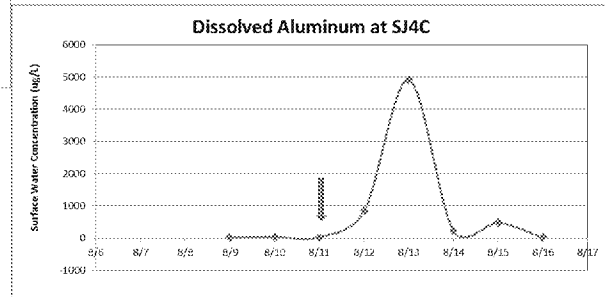
Total & Diss Al at the Four Corners Sampling Station



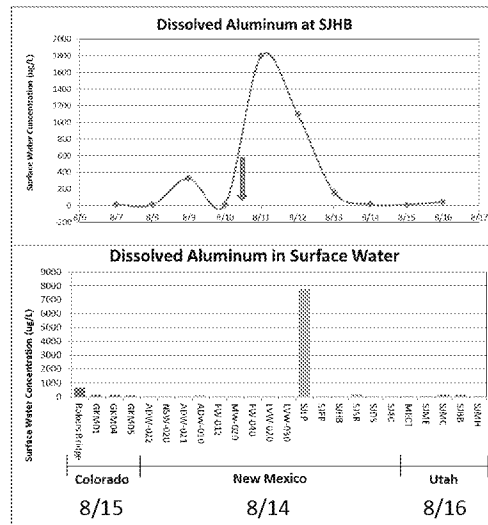
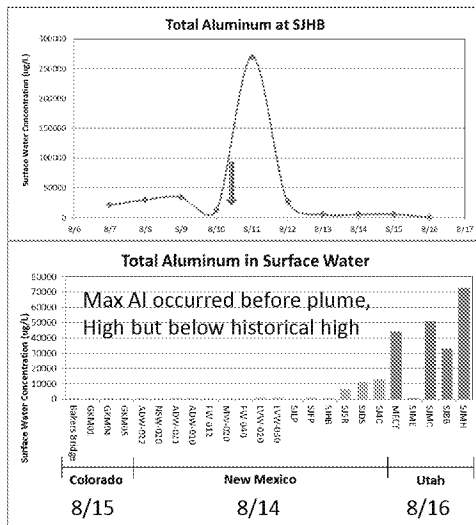
Blue arrow indicates estimated date of plume front at given location

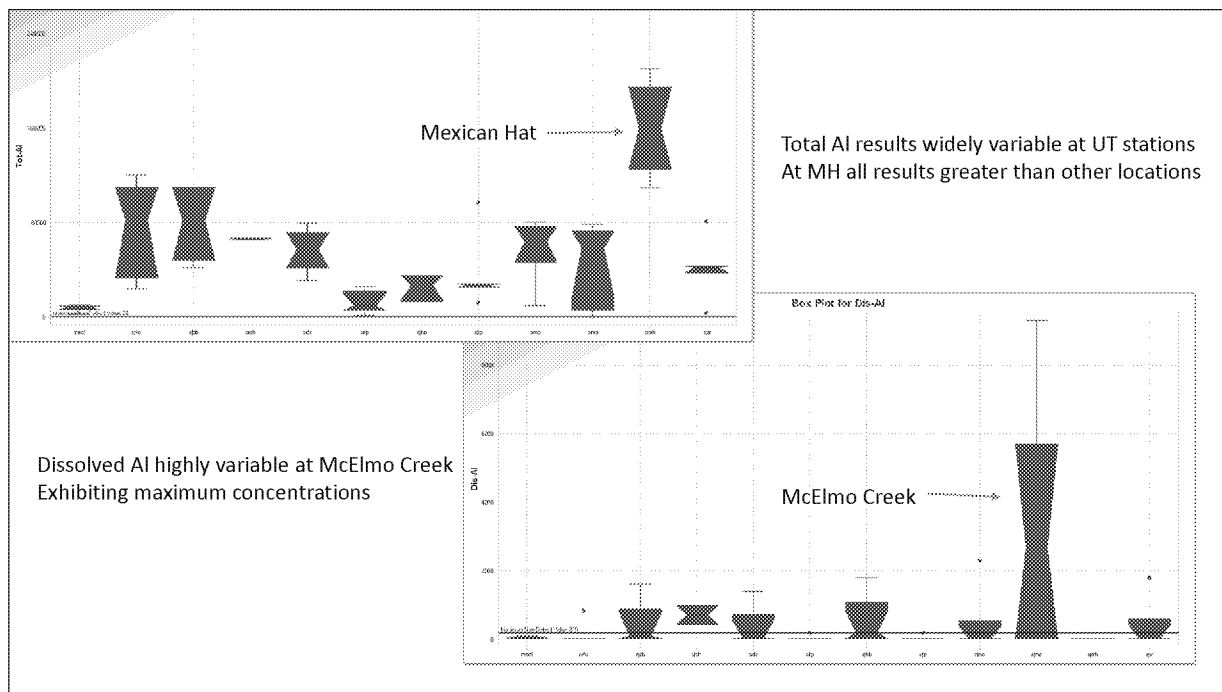
Total present in turbid waters, perhaps 1st front, dissolved may follow

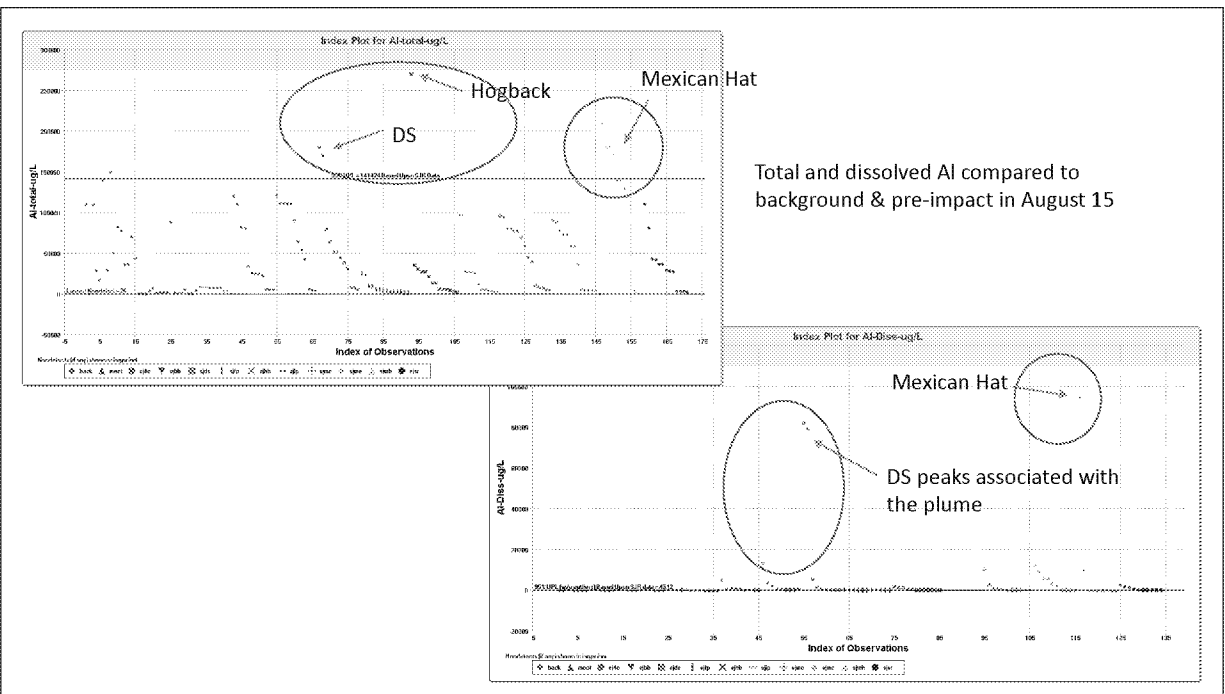
Total peaks at this location between 8/10 & 8/13
 Dissolved peaks between 8/11-13
 Levels remain comparable to 8/15 & 16 on 8/17 & 18
 for both total (8,600 – 5,900 ug/l) & diss (240-1,300 ug/l)



Al at upstream stations (Hogback)







Comparison using only August 15 Data

- Variability in Al (and Fe) much greater west of DS (UT or desert stretch) than between confluence and Shiprock.
 - At station LP: 30566, Ratio w 4C: 1:87
 - At station HB: 425721, Ratio w 4C: 1:6
 - At station 4C: 2667468
 - At station DS: 1350000000, Ratio w HB: 1:3171
 - At station ME: 16639014, Ratio w HB: 1:39
 - At station MH: 1211000000, Ratio w HB: 1:2844
- Results suggest no comparison between western stations and NM segment or established plume measurements.
- Peaks but NO TRENDS observed at any station results of dissolved metals peak before and after the plume with similar variability